INFO 6210 Data Management and Database Design

PROJECT SUBMISSION - 3

DATABASE DESIGN FOR REUSABLE ITEMS ON E-COMMERCE PLATFORM

TEAM DETAILS:

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Team Members:

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Introduction:

Items such as furniture, clothes, footwear, containers and cans have increasingly been thrown away even when they can be reused. There is a need for an online system where all these records can be stored, that can be used again by the customers who are willing to buy them at a cheaper rate.

Problem statement:

- Currently, most users don't have access to an online local store for used items. The buyer usually goes to a local thrift store if they want to look for used/2nd-hand items.
- Other online platforms usually are too general (like Amazon) with too much information or lack severe security/payment options (like Craigslist).
- The site is post-oriented instead of item-oriented (ie, you cannot search based on item filter, see item quantities, etc)
- Users cannot see the buyer/seller information (including selling posts, review, and other things) so mostly it is anonymous.
- Users cannot make an online payment and get the post updated automatically. They will either need to remove/update the post themselves.

Objectives:

To design a database for reusable items which should have the following features:

· Users must be able to register by entering their details namely username, password, phone number, and email.

· System must be able to store all the details of the users and the used/2nd-hand items.

· Users must be able to login using their username and password.

· Users must be able to add and update the details of the items.

· Users must be able to view the details of the items and sellers.

· Users must be able to make a deal for the reusable items.

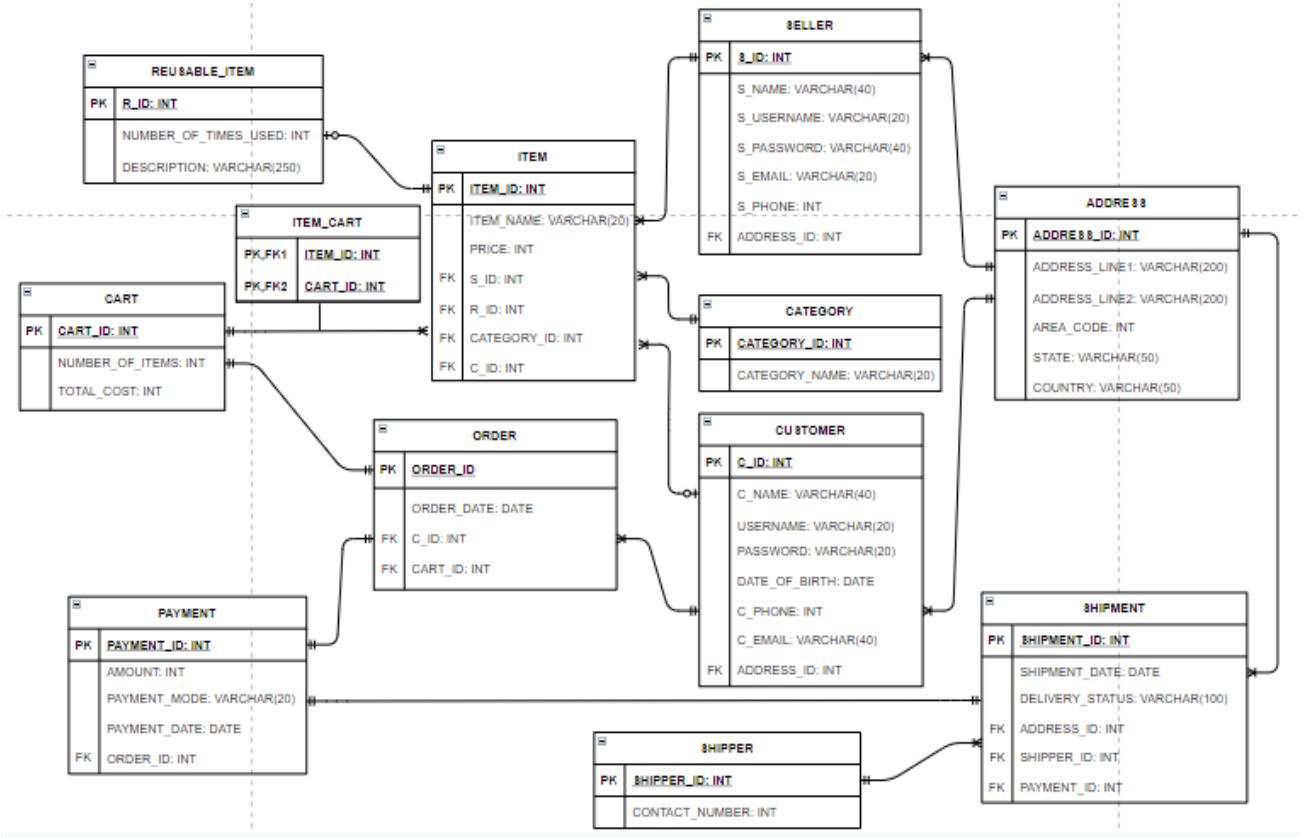
· Users must be able to view the details of the ordered items for payment purposes.

· Users must be able to view the payment details.

Database design document:

- Currently, most users don't have access to an online local store for used items. The buyer usually goes to a local thrift store if they want to look for used/2nd-hand items
    + The database design with current 12 ENTITIES should support the whole online, automated process from customer/seller signing up -> search items -> transactions process -> shipping process with shippers also.
- The other sites are post-oriented instead of item-oriented (ie, you cannot search based on item filter, see item quantities, etc)
    + We have CATEGORY Entity, that has PK as CATEGORY_ID. The ITEM entity will have CATEGORY_ID as Foreign Key so that user can search item using category filter (for furniture, electronic device, etc)
- Users cannot see the buyer/seller information so mostly it is anonymous.
    + We have a separate seller and customer entity with related personal attributes so that users can retrieve info about buy/seller given their id (C_ID, S_ID)
    + Customer/Seller Entity each have a UNIQUE key as C_EMAIL & S_EMAIL to prevent duplicate entry/record when the user signs up. This will help avoid anomalies in our relational database model.
    + Item Entity will have C_ID & R_ID as FOREIGN KEY so user can retrieve and fetch data from CUSTOMER Entity & REUSABLE Entity regarding customer info & item description
    + Each Item has an S_ID (seller ID) as Foreign Key so users can always retrieve a list of items being sold by the same seller.
- Users cannot make an online payment & handle the shipment easily
    + We have a payment and cart entity to allow the user to choose checkout method/view cart items, costs, Each payment and cart will have an unique payment id and cart id. This can be used as a key for connecting to customer entity data.
    + Items will be put into CART which will be ordered by the customers by having CART_ID as a FK in ORDER entity.
    + Each Shipment assigned for a specific shipper can be viewed with SHIPPER_ID as FK in SHIPMENT Entity

Entity Relationship Diagram (Final)



Entity and Attributes with Data types defined:

1. SELLER ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
S_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
S_NAME	VARCHAR(40)	NOT NULL
S_USERNAME	VARCHAR(20)	NOT NULL
S_PASSWORD	VARCHAR(40)	NOT NULL
S_EMAIL	VARCHAR(20)	UNIQUE KEY, NOT NULL
S_PHONE	INTEGER	NOT NULL
ADDRESS_ID	INTEGER	A Foreign Key which REFERENCES ADDRESS_ID from ADDRESS ENTITY. This is used to fetch sellers's address details.

		NOT NULL

2. CUSTOMER ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
C_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
C_NAME	VARCHAR(40)	NOT NULL
PASSWORD	VARCHAR(20)	NOT NULL
USERNAME	VARCHAR(20)	UNIQUE KEY, NOT NULL
DATE_OF_BIRTH	TIMESTAMP	CURRENT_TIMESTAMP
C_EMAIL	VARCHAR(40)	UNIQUE KEY, NOT NULL
C_PHONE	INTEGER	NOT NULL
ADDRESS_ID	INTEGER	A Foreign Key which REFERENCES ADDRESS_ID from ADDRESS ENTITY. This is used to fetch customer's address details. NOT NULL

3. ITEM ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
ITEM_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
ITEM_NAME	VARCHAR(20)	NOT NULL
PRICE	INTEGER	NOT NULL
S_ID	INTEGER	A Foreign Key which REFERENCES S_ID from SELLER ENTITY. This is used to fetch seller's details. NOT NULL
R_ID	INTEGER	A Foreign Key which REFERENCES R_ID from REUSABLE ENTITY. This is used to fetch reusable item details. NOT NULL

CATEGORY_ID	INTEGER	A Foreign Key which REFERENCES CATEGORY_ID from CATEGORY ENTITY. This is used to fetch category details. NOT NULL
C_ID	INTEGER	A Foreign Key which REFERENCES C_ID from CUSTOMER ENTITY. This is used to fetch customer details. NULL ALLOWED

4. REUSABLE ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
R_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
NUMBER_OF_TIMES_USED	INTEGER	NOT NULL
DESCRIPTION	VARCHAR(250)	NOT NULL

5. CATEGORY ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
CATEGORY_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
CATEGORY_NAME	VARCHAR(20)	NOT NULL

6. CART ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
CART_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
TOTAL_COST	INTEGER	NOT NULL
NUMBER_OF_ITEMS	INTEGER	NOT NULL

7. PAYMENT ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
PAYMENT_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
PAYMENT_MODE	VARCHAR(20)	NOT NULL
AMOUNT	INTEGER	NOT NULL
PAYMENT_DATE	TIMESTAMP	CURRENT_TIMESTAMP
ORDER_ID	INTEGER	A Foreign Key which REFERENCES ORDER_ID from ORDER ENTITY. This is used to fetch order details. NOT NULL

8. ORDER ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
ORDER_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
ORDER_DATE	TIMESTAMP	CURRENT_TIMESTAMP
C_ID	INTEGER	A Foreign Key which REFERENCES C_ID from CUSTOMER ENTITY. This is used to fetch customer's details. NOT NULL
CART_ID	INTEGER	A Foreign Key which REFERENCES CART_ID from CART ENTITY. This is used to fetch cart details. NOT NULL

9. SHIPMENT ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
SHIPMENT_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
SHIPMENT_DATE	TIMESTAMP	CURRENT_TIMESTAMP
DELIVERY_STATUS	VARCHAR(100)	NOT NULL

SHIP_METHOD_DESC	VARCHAR(250)	NOT NULL
ADDRESS_ID	INTEGER	A Foreign Key which REFERENCES ADDRESS_ID from ADDRESS ENTITY. This is used to fetch customer's address details. NULL ALLOWED
SHIPPER_ID	INTEGER	A Foreign Key which REFERENCES SHIPPER_ID from SHIPPER ENTITY. This is used to fetch shipper's details. NOT NULL
PAYMENT_ID	INTEGER	A Foreign Key which REFERENCES PAYMENT_ID from PAYMENT ENTITY. This is used to fetch order details. NOT NULL

10. SHIPPER ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
SHIPPER_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
CONTACT_NUMBER	INTEGER	CURRENT_TIMESTAMP

11. ADDRESS ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
ADDRESS_ID	INTEGER	PRIMARY KEY, AUTO GENERATED
ADDRESS_LINE1	VARCHAR(40)	NOT NULL
ADDRESS_LINE2	VARCHAR(40)	NOT NULL
AREA_CODE	INTEGER	NOT NULL
STATE	VARCHAR(20)	NOT NULL
COUNTRY	VARCHAR(24)	NOT NULL

12. ITEM_CART ENTITY

ATTRIBUTES	DATA TYPE AND SIZE	COMMENTS
ITEM_ID	INTEGER	A Foreign Key which REFERENCES ITEM_ID from ITEM ENTITY. This is used to fetch item details. NOT NULL
CART_ID	INTEGER	A Foreign Key which REFERENCES CART_ID from CART ENTITY. This is used to fetch cart details. NOT NULL

Business Rules

- Each account creation will need a valid username/password/email/phone.
- Each unique email can only be associated with one account (buyer/seller/shipper)
- Account passwords need to be at least 8 characters long with at least 1 upper case + 1 symbol.
- Each customer/seller must have one valid address.
- A seller can sell more than one item.
- Every category must have at least one item.
- An item can be bought by zero or one customer.
- An item can belong to only one category.
- The number of times a reusable item can be used is 5.
- Each customer can only have 1 active cart at a time. If they want to create a new cart, they will need to check out or remove items in the old cart.
- Cart cannot be empty when user want to check out
- No more than 15 items can be added to cart.
- Cart items will be reserved within 20 minutes for user check out. After 20 minutes, it will be available again for other users.
- After the customer confirms the order, they need to finish payment within a 20 minutes session.
- An order is associated with only one cart.
- Payment date cannot be prior to payment date.
- Shipment date cannot be prior to payment date.
- One shipper account cannot have more than 8 active shipments.
- Delivery status can only have 4 options/fields: Preparing /shipping/ delivered/canceled

Security Constraints(User level access, permissions)

There are 4 users -

Admin, Customer, Seller, and Shipper.

ADMIN-

- Admin has access to all the tables.
- Admin has READ and WRITE permissions for all the tables.
- Admin decides what data is available to the users.

CUSTOMER-

- Customer has permission to ADD, UPDATE, DELETE his/her information in the Customer table.
- Customer has READ and WRITE permission to the Address table. In the Address table, a customer can add a new address, delete his/her old address.
- Customer has READ and WRITE permission to the Cart table. A customer can ADD or DELETE items from the cart table.
- Customer has READ and WRITE permission to the Payment table, he/she should be able to UPDATE payment details like payment mode in that table.
- Customer has READ only access to Item, Category, Order, Shipment, Resuable_item tables.

SELLER-

- Seller has permission to ADD, UPDATE, DELETE his/her information in the Seller table.
- Seller has READ and WRITE permission to the Address table. In the Address table, a seller can ADD a new address, delete his/her old address.
- Seller has READ and WRITE permissions to the Item, Resuable_item tables. A seller can ADD, UPDATE or DELETE items in those tables.

SHIPPER-

- Shipper has permission to ADD, UPDATE, DELETE his/her information in the Shipper table.
- Shipper has READ and WRITE permissions to the shipment table. A shipper can make changes regarding the shipment details in that table.